



Instabilité des prix et système d'information de marché : Eclairage des filières maraîchères au Sénégal

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Instabilité des prix et Système d'Information de Marché : Eclairage des filières maraîchères au Sénégal¹

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Résumé :

Les filières maraîchères au Sénégal ont connu un développement rapide durant ces deux dernières décennies. Cependant, les producteurs restent confrontés à un risque élevé dans la commercialisation en raison de l'ampleur des fluctuations de prix. L'analyse de ces derniers montre que l'importance de leurs variations sur les différentes échelles temporelles (quotidienne – elles sont supérieures à 20% pour certains produits -, saisonnière et inter-annuelle) qui renvoient à différents niveaux de décision des producteurs (mise en marché, choix et calendriers de cultures, stratégie de l'exploitant).

Les formes de coordination entre producteurs et commerçants permettent en partie de réduire cette incertitude. Les *coxers* (courtiers sur les marchés ruraux ou les marchés urbains de gros) jouent notamment un rôle central dans la circulation de l'information. Par ailleurs, les politiques de développement préconisent la mise en place de systèmes d'information de marché (SIM) dans l'objectif de réduire l'asymétrie d'information des producteurs et de stimuler les arbitrages régulateurs du marché.

L'étude met en évidence le faible impact des SIM « classiques » (diffusion par radio, presse écrite). Par contre, l'expérience novatrice de la société privée MANOBI montre qu'un accès à une information ciblée et disponible au moment opportun permet aux producteurs d'améliorer leur capacité de négociation. Ce dispositif récent n'a cependant guère modifié jusqu'ici les modes de coordination existants, qui ne sont pas fonction des seuls besoins en information, mais également des liens sociaux, des transactions liées au crédit, des moyens de transport.

Mots Clés : Système d'Information de Marché, filières maraîchères, coûts de transaction, instabilité des prix

Abstract :

Market gardening has been increasing fast in Senegal. But farmers face high marketing risks: daily price fluctuations exceed an average 20% for some products, seasonality is strong, anticipation based on prices leads to cyclic movements. Farmers and market operators have found various forms of coordination to manage uncertainty. "Coxers" are specifically dedicated to information gathering, either in rural or wholesale urban markets or to transport negotiation. Paid per unit handled, they limit their own risk, whereas they reduce uncertainty for their partners. In other cases, interlinked transactions permit to provide inputs to producers despite the deficient credit market; meanwhile, it secures merchants access to product. As it is the case in many other countries, information provided by MIS is of little help to Senegalese market gardeners. The updated and more targeted access to information through MANOBI services allows producers to improve their negotiation capacity. But it does not modify the existing coordination features, given that they are not only determined by needs in information (but also by social links, access to credit, payment modalities, transport facilities...).

Keywords : horticulture, price analysis, market instability, information, transaction costs.

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Market Information and Price Instability: An Insight into Vegetable Markets in Senegal

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Abstract

Market gardening has been increasing fast in Senegal. But farmers face high marketing risks: daily price fluctuations exceed an average 20% for some products, seasonality is strong, anticipation based on prices leads to cyclic movements. Farmers and market operators have found various forms of coordination to manage uncertainty. “Coxers” are specifically dedicated to information gathering, either in rural or wholesale urban markets or to transport negotiation. Paid per unit handled, they limit their own risk, whereas they reduce uncertainty for their partners. In other cases, interlinked transactions permit to provide inputs to producers despite the deficient credit market; meanwhile, it secures merchants access to product. As it is the case in many other countries, information provided by MIS is of little help to Senegalese market gardeners. The updated and more targeted access to information through MANOBI services allows producers to improve their negotiation capacity. But it does not modify the existing coordination features, given that they are not only determined by needs in information (but also by social links, access to credit, payment modalities, transport facilities...).

INTRODUCTION

In Senegal, market gardening has been increasing steadily, with an average growth rate exceeding 5% per year from 1960 till now. It has been stimulated by urban population growth, increase in prices of imported vegetables following the CFA Franc devaluation in 1994, and by an attempt to diversify production in irrigated rice schemes in the Senegal River Valley. However, the horticulture sector faces strong instability, most vegetables being highly seasonal and perishable. The magnitude of seasonal fluctuations, as well as short term fluctuations can hardly be anticipated. Thus, farmers face high marketing risks which affect their income. Instability of price and irregular availability are also deplored by consumers.

Horticulture development programmes usually tackled this instability issue with three complementary approaches: (i) technical innovations that contribute to spreading the supply over the year (adapted varieties, storage facilities, processing), (ii) organisational devices aiming to reduce transaction costs (wholesale markets, vertical integration, credit), (iii) external information systems, based on the assumption that a better information circulation will improve adjustment between supply and demand. Yet, some of these “solutions” are adapted to only few vegetables: storage for the less perishable ones (onion, potato, garlic); industrial processing mostly for tomato; integration in the case of industrial processing (tomato) or exports (mostly green beans). For the bulk of fresh vegetables markets, in countries where mass marketing is not established, the issue is indeed tricky.

We will focus mainly on the third approach. Market Information Systems (MIS) have been set up in many developing countries after the liberalization of agriculture sector, as a major tool for market self-regulation (Shepherd, 1997). A lot of MIS are dedicated to horticulture sector (Singh, 1991; Shepherd and Schalke, 1995; Robbins, 2000; Poulton et al., 2002; Mahaliyanaarachchi, 2003). In Senegal, several MIS intending to improve information dissemination and transparency in horticultural markets have been set up by public institutions and projects. In 2002, a private company - MANOBI - set up an innovative tool based on information technologies, which permit a fast access to market information concerning horticulture and fishery sectors. However, private operators did not wait for external interventions: long before MIS was developed, they had tried to limit impact of market instability through interpersonal coordination.

Yet, internal forms of coordination are often under-estimated by development programmes which are supposed to have an impact on instability. How does interpersonal coordination actually handle instability constraints? How far MIS can be an alternative solution or a complementary one? We will first try to have a better understanding of instability in Senegalese vegetable markets. Then we will analyze the various forms of coordination adopted to reduce risks and the impact of MIS on these interpersonal relations. Lastly we will consider information solutions v/s organizational solutions within the framework of the three general approaches mentioned above, and discuss their capacity to reduce marketing risks relating to instability.

DATA SOURCES AND METHODS

General Overview of the Area

There are two main horticulture production areas in Senegal. The first one is the Niayes, a 20 to 30 km wide and 200 km long coastal strip that starts just in the North of Dakar. Thanks to its sandy soil, ground water proximity, temperate climate and easy access to the main urban centres, this area has been devoted to market gardening for long. The second area is the Senegal River Valley, where irrigated schemes were first dedicated exclusively to rice. The withdrawal of the State from the sector, which started in 1987, led to a general crisis in the rice sector, whereas the 1994 devaluation boosted the price of imported vegetables – especially onion. Small farming is predominant in both areas (75% market gardening farms represent less than 0.5 ha, 12% from 0.5 to 1 ha, 10% from 1 to 5 ha and 3% over 5 ha – Anon., 2000). Total production grew from estimated 136,000 t in 1990 to 260,000 t in 2002 (Horticulture Dep. data), with onion, tomato and cabbage ranking first.

Price Instability Analysis

With neither very large farm nor dominant buyer, the supply and the demand are well fragmented in the Senegalese vegetable market. Competition prevails and according to operators, price fluctuations are mostly determined by instability in the supply and the demand. Empirical data indeed show that seasonal price fluctuations globally follow seasonal availability. When considering short term fluctuations, the assumption that daily prices perfectly reflect availability of productions is questionable since personal relations can interfere- and difficult to demonstrate, given that no detailed data on supply and demand variations are available). This notwithstanding, price instability by itself is a major concern for producers, since it has a direct impact on their selling conditions.

1. Method. Time series of prices can be distributed into four components: (i) trend, (ii) seasonal, (iii) cycle, (iv) random (Goetz and Weber, 1986). We use a classical multiplicative model, often implemented for agriculture prices studies, given that the range of fluctuations is related to the average price (Minten, 1997; Tschirley, 1998; Temple, 2000):

$$P = T * S * C * E, \text{ with}$$

P = nominal price, T = trend component, S = seasonality component,

C = cycle component, E = random component

In addition to this standard method based on monthly averages, we will analyse very short term fluctuations using daily prices registration available since 2002. The seasonal component of daily prices is eliminated by dividing nominal prices by the mobile average of 10 days. The standard deviation of this index illustrates short term instability.

Empirical knowledge of marketing systems of horticulture products in Senegal will help the interpretation of statistical results (Seck, 1989; David-Benz and Ba, 1999; Wade et al., 2004, MBacké, 2004).

2. Data sources. Long time series are available neither for producer price, nor for wholesale price. Consumer price will then be used as a proxy for instability measurement. Sources of monthly average prices are: (i) CDH1, from 1989 to 1996, (ii) Horticulture

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Department since 1997 (the methodology of both devices are similar). Missing data for 1992 to 1994, and 1997 have been calculated according to the trend. PSI/ISRA2 and SAED3 data are used for cyclic fluctuations analysis. Short term fluctuations analysis is based on daily wholesale prices collected since September 2001 by the private market information system, MANOBI. The main wholesale market in Dakar (Thiaroye) has been select as a reference, either for monthly or daily series.

Forms of Coordination

1. Theoretical Background. To reduce risks lead by price instability, producers and downward operators often rely on personal relations. These organizational arrangements affect the distribution of risk among actors (Klein, 1983; Williamson, 1985; Golberg, 1990). According to Williamson, the various mechanisms of coordination can be explained by considering three main dimensions: specificities of assets, uncertainty and frequency. Jaffee (1992) describes a spectrum of institutional arrangements in horticulture sector in Kenya, moving from pure market coordination to hierarchy (figure 1).

- *Spot market* purchase is characterized by no long term agreements; it is based on market price.

- *Market reciprocity arrangements* are informal agreements, in which mutual confidence is build over time, allowing reduced transaction costs. Nevertheless, no long term agreement is implied and the current market price is taken as reference for transactions.

- *Forward market contracts* imply formal agreements. The product and the period of transaction are specified. Price can be set either *ex ante* or at the time of the transaction. This kind of arrangement reduces uncertainty for sellers and buyers.

- *Interlinked factor and market contracts* are formal as well, and integrate some elements of production process. The buyer provides inputs and often technical advice or quality requirements. The seller binds himself to sell his products to his partner, according to the conditions set by the latter.

- *Vertical integration* incorporates production within marketing and processing; hierarchy relations prevail, the whole operations being controlled by one of the partners.

Moustier and Zebus (2002) applied this spectrum to analyse the effects of produce characteristics on the organisation of vegetable markets in Africa; we will refer to it to discuss instability management in vegetable markets in Senegal.

2. Data Sources. Early data collection was conducted through interviews with producers and market operators, between May and June 2003, in collaboration with ISRA/BAME⁴ (Wade, 2003). The results presented mainly focus on the Niayes area, given that various market information systems have been implemented there for several years. Survey locations have been selected according to crop specificities and information access. There is a wide range of vegetables in the south of Niayes, the most perishable ones being grown in the vicinity of Dakar; diversity decreases as one moves towards the north, onion becoming predominant. A total 182 producers have been surveyed in MBoro and Potou, two of the main growing centres. Mboro is an area of diversified production, located in the central area, at about 80 km away from Dakar. Potou is at 220 km from Dakar; it's the

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most important onion production village in the Niayes. MANOBI is not yet well-spread all over the Niayes; therefore, two specific areas have been selected to survey 16 clients of MANOBI: Sangalkam, a highly diversified area in the suburbs of Dakar, and Rao, a village located 270 km away from Dakar, mostly devoted to onion.

RESULTS

The assertion of instability of vegetable markets is often too general. Before analysing different options to overcome it, it appears necessary to better characterize this instability.

Instability Decomposition

1. Trend. Price increase has been rather limited over the period, although more acute for some vegetables (tomato and okra) than for others (figure 2 to 6). Unfortunately, the lack of data for the period going from 1992 to 1994 does not make it possible to have a clear view of the devaluation impact. But no major bump is noticeable over that period.

2. Seasonality. Seasonal variations are strongly related to the climatic requirements of each crop. In Senegal, excess of water and high temperatures from July to September limit vegetable growing during the rainy season. Figure 7 shows the Grand Seasonal Index (GSI) for five products. The general profiles reflect the main harvest season: most vegetables are seeded after the rainy season and the main harvest period runs from January to June. Okra appears as an exception: it is mostly planted during the dry and hot season, and lower prices are recorded after the rainy season. Seasonality appears to be very strong for tomato and cabbage; onion and okra emerge in the second position; fluctuations are less pronounced for aubergine.

The accuracy of temporal seasonal profiles drawn by GSI can be measured with the standard deviation of monthly index (Tschirly, 1998). It can be interpreted as the level of uncertainty at different periods of the year (table 1). The sum of monthly standard deviations gives an indication of global variability of seasonal fluctuations, from one year to the other. For tomato, cabbage and onion, and in a lesser extent aubergine, uncertainty is lower during full harvest season than at the beginning and the end of season. For onion, uncertainty decreases from August to December, since the supply is regulated by imports. Uncertainty is very high all over the year for okra; this can be explained by the fact that it is particularly perishable.

3. Cyclic Fluctuations. Due to lack of data for 4 years out of the 14 considered, cyclic fluctuations cannot be accurately analysed. However, operators in the horticulture sector are aware of this commonly described *cobweb* phenomenon: good prices, in a given year, prompt farmers to increase their production the following year. As the output increases, prices drop, leading to the reduction of acreage. Onion in the Senegal River Valley, where statistics on surfaces are much more reliable than in the Niayes, illustrates the relation between average prices during a given year and cultivated area on the the following year, although data on only few years are available (figure 8).

4. Daily Fluctuations. Very short term instability is higher for the most perishable crops: standard deviation of daily fluctuations index ranks from 0.08 for onion to 0.23 for green beans (table 2). These fluctuations are very difficult to anticipate, for they derive mostly from irregular arrivals of trucks and the relatively thin size of the market.

Organisation versus Market Information: Different Options to Prevent Instability?

These different temporal scales of price fluctuations are related to different natures of farmers' decisions: trend concerns long term strategic decisions, seasonality and cyclic fluctuations concern year to year crop planning, short term fluctuations concern transactions. Farmers face uncertainty when making these different decisions: they are limited by access to information, inability to use it even when available and/or the unpredictable nature of some fluctuations. But the level and nature of uncertainty are not similar for each type of decision. So we need to detail organisation versus information options and analyse which types of decisions are concerned and how far they bring a "solution".

1. Coordination in Vegetable Commodity Systems. Apart from wholesalers and retailers, three different categories of intermediaries can be identified in the Senegalese vegetable markets.

- "*Bana-banas*": mobile middlemen that collect products from the growing areas and take them to urban markets.
- Assembler producers: big farmers that increase their activity by buying vegetables to smaller ones. They send their goods directly to urban wholesale markets. Some of them own warehouses for onion and potatoes and provide credits to farmers.
- "*Coxers*": brokers who establish the contact between seller and buyer and help negotiating but never possess the goods. Urban *Coxers* take delivery of goods, look for a buyer and negotiate the price (meantime the owner of goods has already gone back). Two other types of brokers have a strategic position as well: Rural *Coxers* and Transport *Coxers*. Both are located in rural areas and are often farmers themselves.

At producer level, three main organisational patterns can be distinguished.

(i) The producer sells his production to a *Bana-bana*, but he requests the intermediation of a Rural *Coxer*. Being paid on a fixed base per bag, the *Coxer* takes no risk. Thanks to the latter's knowledge of the market situation, the producer cannot be cheated by the *Bana-bana*. Here the *Coxer* can be compared to an information service, but in addition, he solves the problem of partner seeking. Due to a decrease in uncertainty, the transaction can be based on *spot market*. This pattern is dominant in most of the Niayes: 80% of the producers in the central area (Mboro) and 47% in the north (Potou). It implies that the farmer has a great confidence in the *Coxer*. This confidence is based on long term relations and social links.

(ii) The producer deals directly with *Bana-bana*. In this case, the main source of market information is the *Bana-bana* himself. The farmer is then strongly dependent on his commercial partner's honesty. Due to strong asymmetry of information which disadvantages the farmer, this case occurs mostly nearby Dakar, where direct access to information is easier for farmers. And diversification being important in this area, the risk involved in a single transaction is limited, considering the overall activity of the farmer. No formal contracts are established; long term relations prevail, such as *market reciprocity agreements*.

(iii) The producer is strongly tied to an Assembler Producer. This situation is mostly found in Potou (31% of the farmers interviewed in this village), an area

specialised in the cultivation of onion. It can be explained by the stiff competition among buyers: providing input, the Assembler Producer can be sure that he will get the vegetable and the variety expected, at the required period (price is negotiated *ex-post*, on market price base). It is important for onion, since different varieties permit to extend the harvest period from February to October. Moreover, for those owning warehouses, quality requirements are critical in order to limit conservation losses. On the producer' side, the distance from Dakar makes diversification to be more limited in Potou than in the central or southern areas of the Niayes. The higher specificity of sellers and buyers assets can explain this form of *interlinked factor and market contract*.

At wholesale market level, *Coxers* are known as playing a major role (Seck, 1989; Pelletier, 1997; Wade et al., 2004). To take products to urban markets, *Bana-banas* contact *Coxers* specialised in transports. The *Bana-bana* gives an advance to the driver to pay the Transport *Coxer* and fuel. The Urban *Coxer* takes delivery of the goods. He pays the driver, stores the goods, find a buyer and negotiate the price. In return, he is paid a fixed commission per bag or basket by the *Bana-bana*. The urban *Coxer* can even provide capital to the *Bana-bana*, to enable him to go back to the production areas, even if the goods are not yet sold. The *Bana-bana* faces strong uncertainty about price level at the destination, about the quality of the product (that can suffer degradation during transport) and about selling delay. The urban *Coxer* reduces these uncertainty factors. The transaction between *Bana-bana* and wholesalers can then be qualified as a *spot market purchase*.

The various categories of *Coxers* appear to have a crucial function in information dissemination among the different parties. Their knowledge is reinforced by personal relations with their commercial partners. Their activity includes almost no uncertainty (except the risk of running out of customers if they do not provide satisfactory services) and critically reduces uncertainty about goods handlers.

Market Information Systems have been designed to provide a broader access to information. We can then wonder how they interfere with these endogenous coordination mechanisms which are strongly determined by informational concerns.

2. Market Information Systems to Increase Markets Efficiency. The role of information in reducing uncertainty faced by market operators has been underlined for long. It is one of the reasons why MIS was promoted (Shepherd, 1997). Among expected effects, a better knowledge of supply and demand situation is supposed to improve temporal and spatial arbitrage, leading to a reduction of price variability.

In Senegal, four different MIS directed to horticulture products can be distinguished.

- In the early 70's, the CDH started to follow-up consumer prices in the main markets of Dakar. The device was transferred to the Department of Horticulture (DH) en 1996. Monthly average prices have been published in news-papers (although irregularly, depending on projects funds) but they have been mostly used by administration, researchers and projects. The three other information systems are more focused on a professional use.

- One has been set up by a project - PAEP5 - directed towards the promotion of onion and potato. Between 1998 and 2002, wholesale prices of onion and potato in rural markets of the Niayes, and in markets of Dakar, Touba and Kaolack, were weekly broadcast over radio stations.

⁵ Projet d'Appui à l'Entreprenariat Paysan

- In the Senegal River Valley, PSI/ISRA started in 1998 with the collection of retail prices, wholesale prices and volumes in 5 markets in the northern region. Printed bulletins were issued every 6 months, and information was used in collaboration with the local development structure (SAED) as discussion material with farmers' organisations. In 2002, the device was transferred to SAED.
- MANOBI, a private enterprise created in 2001, introduced a major innovation: backed by an already good dissemination of mobile phones in rural areas, it included them, as well as the Internet and WAP⁶ in MIS's concept. These technologies permitted (i) to reduce transmission delay to few hours between the information collection and its availability to users, (ii) to provide a much broader range of services, adapted to different categories of users. Thanks to the flexibility of a private structure, that is per se an innovation, MANOBI has the capacity to adjust its services very fast. It started its activities with horticulture and fishery. For horticulture, three main services are provided: daily prices (wholesale, medium sale and retail) in major markets in Dakar, Touba and Kaolack; qualitative indication of daily availability in the same markets; individual offers for sale or to purchase. The tool was first tested with about a hundred farmers, equipped with WAP. In order to attract more customers, while reducing the cost of access, the system was adapted to SMS at the end of 2003. Information became available to anyone possessing a simple mobile phone, without entry cost and only standard communication fees - MANOBI getting returns from the phone company (NB: field interviews have been carried out just before SMS access was developed). More diversified services are being experimented, like the measurement of plots with GSM, calculation of production budget, internal communication device for farmers' organisations...

Actually, information gathered by "classical" MIS has been little accessible to producers and not really adapted to their needs. Radio broadcasting has been limited, except for onion and potato that were covered by PAEP. Reasons raised by interviewed farmers include: (i) inadequate hours of broadcast, (ii) too long weekly frequency - given that prices fluctuate very fast, daily information would be necessary, (iii) only onion and potato prices are broadcast. For the latter, survey results show a good audience (52% farmers). However, even if they listen to PAEP's programme, most farmers did not actually significantly change their production or marketing practices: they use the information as a baseline to start negotiating, but they still require the service of *Coxers*, who have more updated information. Organisational forms have a strong influence as well: in Potou, where producers are tied to assembler producers who grant them credits, only 2% farmers have changed their marketing habits, whereas where *spot market* transactions with the mediation of *Coxers* prevail (in MBoro) 19% did so. This limited impact of MIS at operators' level corroborates results of previous studies. Some authors deplore that the administrative conception of these devices which is more directed towards public services, hampered their use by the private sector (Schubert, 1983; Robbins, 2000). DH system features in this category. Shepherd (1997) emphasizes on the lack of financial resources to maintain these systems, leading to technical constraints such as the poor quality of information, delays and insufficient frequency of transmission, processing and dissemination, or non relevant type of information. Either PAEP or ISRA systems faced these financial constraints. More fundamental criticisms were raised by Galtier and Egg (1998): information broadcasting cannot have a significant impact on

⁶ WAP : Wireless Application Protocol permits to connect to Internet with a mobile phone.

situations where entrusted relations and interlinked transactions prevail. Arbitration can occur only if operators can make free choices.

Improved communication systems should be able to overcome a number of technical constraints. Indeed, surveys show that MANOBI users are globally satisfied with the services provided. Information is mostly used in strengthening farmers' negotiation capacity with *Bana-banas*. The crux of this system is not only its very short delay of processing and transmission but also its flexibility. Operators can get accurate information on what they are seeking, at any time, without being snowed under useless data. Meanwhile, there are little evidences of changes in coordination forms. Most MANOBI clients continue to sell to the same *Bana-banas* like before. This can be explained by credit relations that tied some producers with *Bana-banas*. Lack of relations with urban *Coxers* is also a barrier. Moreover, whereas *Bana-Banas* can pay cash, they would have to afford payment delays, given that a whole load cannot be sold in one day.

DISCUSSION

When sequencing time series of prices, two points clearly appear. First, instability and unpredictability are not of the same extent for all components (that correspond to temporal scales), and they derive from various sources. Secondly, each component interacts with farmers decisions: it influences decisions and the aggregation of individual decisions influences them. Depending on temporal scales, different technical, organisational and informational options are (or could be) adopted to reduce uncertainty surrounding these decisions. As an attempt of synthesis, we can draw a general framework showing how these "solutions" are relevant to different temporal scales. Some are actually implemented by the actors of the vegetable sector or by public institutions and projects; others could be so (table 3).

Very short term instability appears to be a particularly tricky issue. Its magnitude depends on the specificities of each vegetable, but it is high in general. Daily (or shorter) fluctuations are very difficult to anticipate, because they derive mostly from irregular arrival of trucks and the relatively thin size of the market. Only information available within few hours can be of some use for the operators, which is technically impossible for a "classical" MIS. Thanks to new information technologies, transmission time can now be dramatically reduced. An updated knowledge of the market situation gives farmers more marketing power to negotiate. But their personal links with downstream operators often limit their possibility to undertake temporal or spatial arbitration. Moreover, for the most instable products whose price vary frequently, more than 20% per day, the price on which the farmer bases his decision of harvesting or loading might be significantly different from the one he will actually get at the destination. As for now, farmers mostly rely on rural *Coxers* to limit risks related to short term fluctuations and to strengthen their negotiation capacity; and they manage to provide updated information. It is indeed significant that MANOBI choose to promote its services in areas where *Coxers* are less present, given that the latter services are difficult to compete with. However, with the reduction of its access cost, down to a simple telephone call, MANOBI might compete more directly with rural *Coxers*, leading to a generalization of direct relations between farmers and *Bana-Banas*. But urban *Coxers* position will not be questioned, given that their functions are not limited to price negotiation. Better access to "instantaneous" information and vertical coordination appear to be complementary in order to counter short term instability.

Seasonal fluctuations, often seen as the main problem regarding instability of vegetable markets, are actually the ones that can be the more easily anticipated. Moreover, the risk is reduced for most producers, because year to year changes in the shape of seasonal profile are limited during full harvest time. A better circulation of current market prices cannot have a major effect on seasonal fluctuations. It is rather thanks to technical improvements, including diversification of varieties or/and storage, that these fluctuations can be reduced. However, high uncertainty at the beginning and at the end of season makes strategies for early or late harvests risky. For framers who are willing to diversify, in order to avoid full-season harvests or to store their production, a good knowledge of seasonal fluctuations and of variability of annual profiles can be helpful for medium term decision on crop planning. This kind of analytical information, that needs to be backed-up with some training, has been little disseminated; it is an area that information system should develop. Information on imports can fit this category. Mostly for onion, unpredicted imports often severely disrupt local production, either because export prices collapse or because importers underestimate local production or fear forthcoming restrictions of imports.

Cyclic fluctuations are more difficult to overcome. They are often related to the phenomenon of over-anticipation which emanates from the addition of individual coherent anticipations. The more price information is accessible, the more agents react similarly to price signal. Inter-personal coordination could limit these cyclic fluctuations. But vertical integration driven by downstream operators (wholesalers) could not be compatible with the very atomistic structure of local markets of fresh vegetables. Horizontal coordination at production level could contribute to rationalize collective anticipation, setting up consistent seasonal objectives and enforcing them through collective action. This implies to bring together “organisational solutions” and “information solutions”: to build-up farmers’ organisations, to give them some capacity to control production (through credit or inputs for example) and to disseminate analytical knowledge on production and market dynamics.

CONCLUSION

Usual Market Information Services are not efficient to reduce risks related to market instability, compared to endogenous forms of coordination strongly determined by this uncertain environment. *Coxers* are critical intermediaries to handle uncertainty and reduce transactions costs; they can be considered as “information services”. However, a device based on information technologies appears to be able to have an impact on its users, mostly reinforcing their market power. So far, it did not significantly modify the organisational structures of the marketing system, since services provide by the different intermediaries are not limited to information. But MANOBI implantation is still very recent and a longer term analysis would be necessary to assess the impact of a broader extension of this system.

Different issues are to be considered to rethink market information devices for professional uses in the horticulture sector. To limit short term risk faced by producers, information systems cannot have any effect, unless new communication media are used, given the price fluctuations frequency and amplitude. But this “spot” information is insufficient to tackle seasonal and inter-annual fluctuations. At this medium term scale, more analytical and retrospective information is needed to anticipate adequately. And whatever the complexity of information devices, technical requirements have to be met in order to be able to spread out the marketing period (availability of adapted seeds and

other inputs, storage facilities...). Still, optimising individual anticipation might have a counter-effect, unless collective action is undertaken at production level to avoid cyclic effects. The conception of market information systems therefore needs to be reshaped, taking into account the agents' organisation and all the services surrounding agriculture.

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Tables

Table 1. Standard deviations of seasonal index (Dakar, 1989-2002)

Month	Aubergine	Cabbage	Onion	Okra	Tomato
January	19	10	17	26	12
February	8	7	14	9	4
March	11	9	9	25	9
April	5	6	5	15	7
May	6	5	7	17	8
June	3	5	10	11	7
July	8	6	12	8	7
August	7	12	9	10	19
September	9	14	9	12	24
October	11	22	9	8	25
November	8	15	6	7	41
December	15	6	8	13	21
TOTAL	<i>111</i>	<i>117</i>	<i>116</i>	<i>161</i>	<i>183</i>

Table 2. Standard deviation of daily fluctuations of wholesale price index (Dakar, October 2002 to May 2005)

	Onion¹	Tomato	Okra	Cabbage	Aubergine	Green beans
Standard deviation	0,08	0,14	0,18	0,19	0,21	0,23

¹ from January to December 2002.

Table 3. Temporal scale of instability and possible options to reduce marketing risk

		“Solutions”			
		Information	Vertical coordination	Horizontal coordination	Technical improvement
Temporal scale	Trend	★		★	+
	Cyclic fluctuations	★		★	
	Seasonality	★			++
	Short term fluctuations	+	++		

++ : dominant implemented solution , + : secondary implemented solution,

★ : potential solution to be developed

Figures

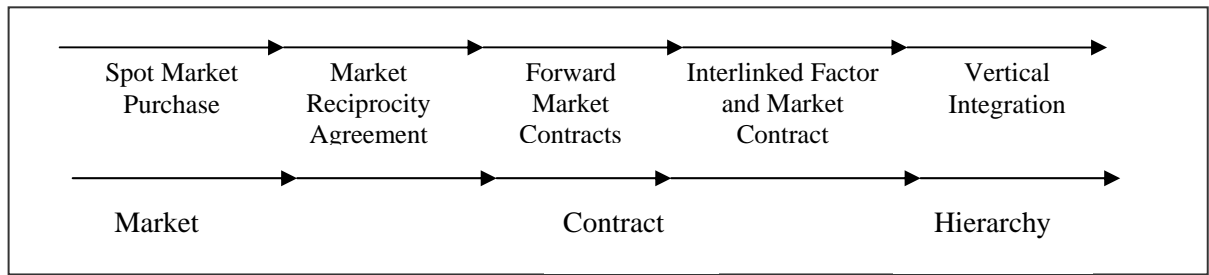


Fig. 1. A continuum of contractual arrangements

Source: Jaffee (1992)

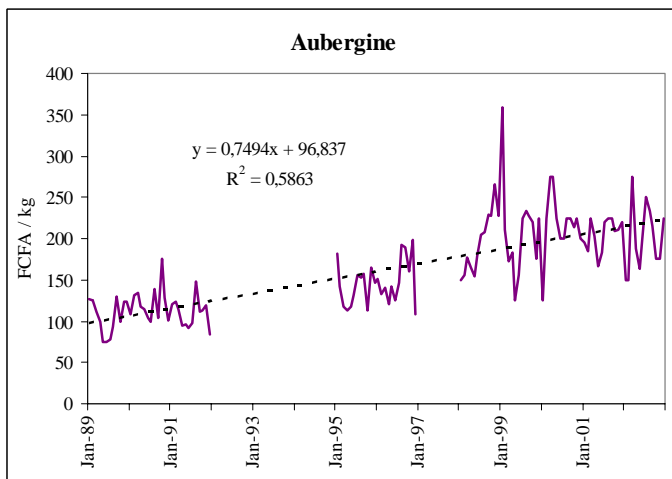
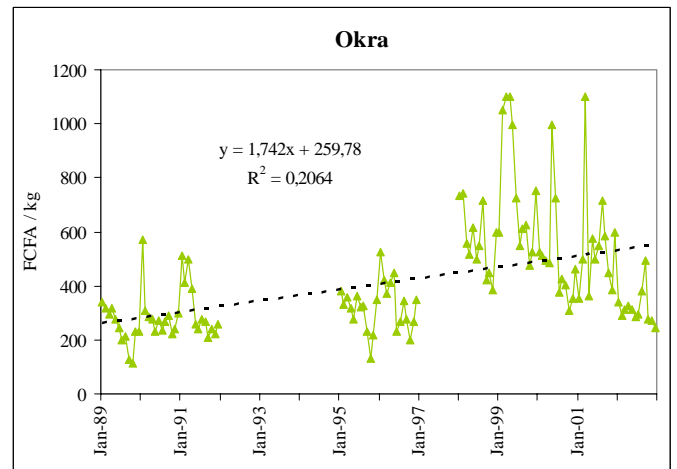
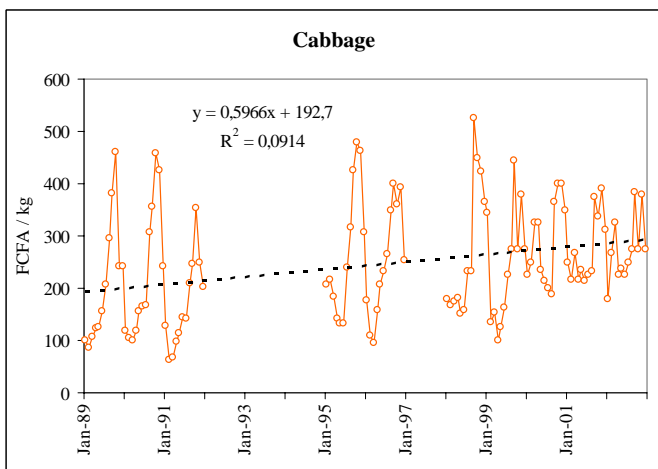
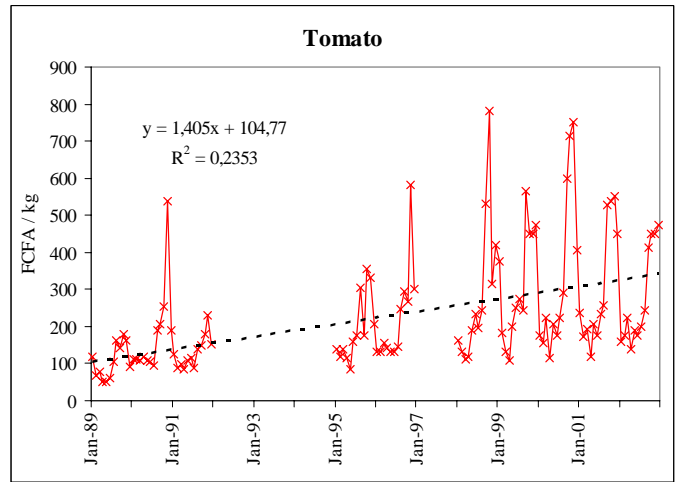
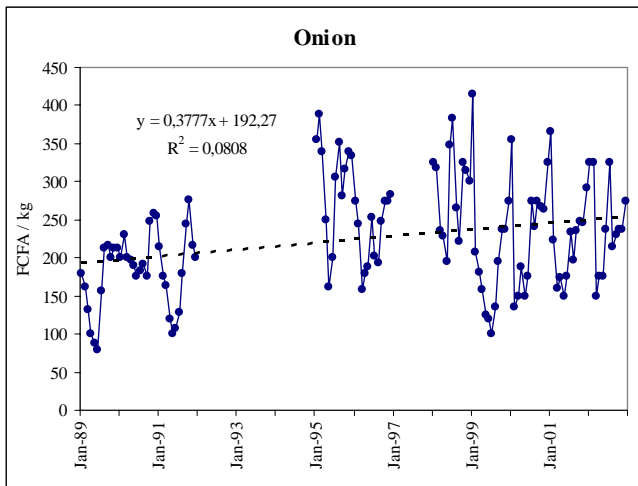


Fig. 2 to 6. Nominal monthly retail prices and trend (Dakar, 1989- 2002)

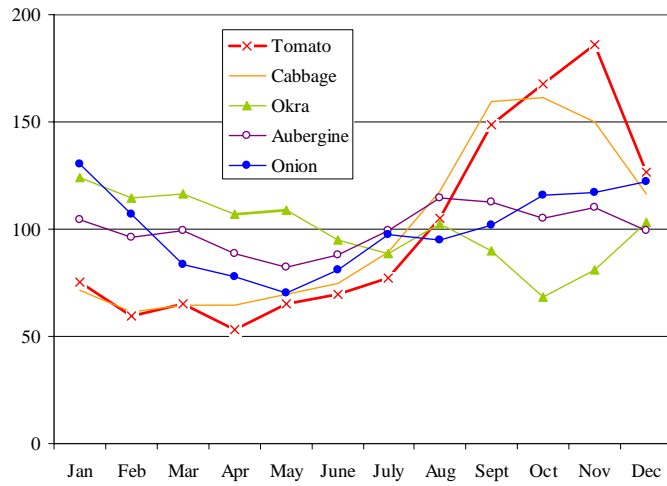


Fig.7. Grand Seasonal Index (Dakar, retail price, 1989- 2002)

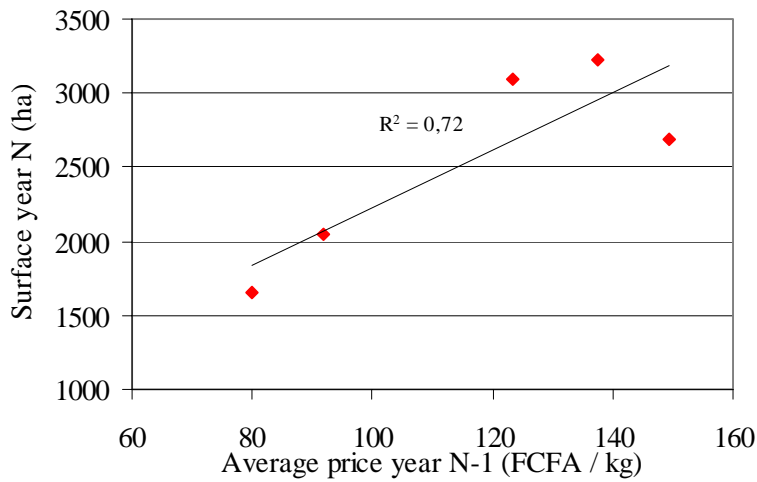


Fig. 8. Influence of average price of onion on the acreage in the following year (wholesale price in rural market and acreage in the Senegal River Valley, from 1997/98 to 2002/03)